REMARKS

This amendment is responsive to the Office Action of August 9, 2007. Reconsideration and allowance of claims 1-4, 6-10, 12, and 14-26 are requested.

The Office Action

Claims 1-3, 5-17, and 19 stand rejected under 35 U.S.C. § 103 as being unpatentable over Sodickson (US 2002/0158632) in view of Rupp (US 5,784,636).

Claims 4, 18, and 20-22 stand rejected under 35 U.S.C. § 103 as being unpatentable over Sodickson in view of Rupp, further in view of Farwell (US 6,920,545).

The References of Record

Sodickson is exemplary of the acknowledged prior art discussed on page 1 of the present application. Sodickson, as the Examiner notes, can process the data using a multi-processor computer system or may include multiple computers. There are no details or examples of suitable multiprocessor systems.

Rupp goes to enablement in that it shows that reconfigurable computer architecture is known in the art and that a reconfigurable processor for use as described in the present application might be a purchasable commercial product.

Farwell shows that cross-bar switching is a known technique, but provides no motivation to use cross-bar switching in medical diagnostic image reconstruction.

The Claims Distinguish Patentably Over the References of Record

Claim 1 is directed to an MR system which includes a plurality of receive coil configurations, each configuration having n outputs. Different ones of the receive coil configurations have a different number of outputs.

A plurality of receivers are configured for demodulating the MR signals from the outputs of the receive coil configuration. Thus, because the coil configurations have different numbers of outputs, sometimes all of the receivers are connected with an output and sometimes only some of the receivers are connected with an output and are "used".

Within such a system, a plurality of processing units are dynamically reconfigured into a plurality of stages of parallel processing channels, each channel connected with one of the n used receivers. Thus, when n is relatively small, there are a relatively large number of stages in each processing channel and when n is relatively large, there are a smaller number of stages in each processing channel.

Sodickson is directed to a SMASH magnetic resonance imaging system. SMASH, of course, is a parallel imaging technique. Parallel imaging is not synonymous with parallel imaging. In a parallel imaging technique, the examination region is surrounded by a plurality of independent receive coils, each with slightly different receive characteristics. This enables each magnetic resonance echo that is read out to generate as many data lines as there are receive coils. This is as opposed to the more traditional birdcage style coil in which each echo was read out to produce a single data line in k-space. As set out in Sodickson, parallel imaging is not as simple as the above summary. Rather, relatively heavy duty data processing is required. As is commonly found in magnetic resonance imaging patents, Sodickson indicates that this data processing can be carried out by one or more computers.

First, there is no suggestion in Sodickson of any ability to alter the number of outputs of the receive coil configurations. Moreover, there is no suggestion in Sodickson to reconfigure the data processing resources in accordance with the number of receivers which are actually used. Rupp does not cure this shortcoming of Sodickson. Rupp, in the section noted by the Examiner in column 1 is directed to a computer with reconfigurable architecture which enables the **end user** to configure the architecture to implement a selected one of a wide range of logic functions. First, Rupp does not suggest reconfiguring processor resources in accordance with a number of receivers used. Moreover, Rupp is directed to a user reconfigurable architecture and does not suggest dynamically reconfiguring the computer resources in response to a number of receivers utilized, or the like.

Second, claim 1 calls for the computing resources to be reconfigured into stages of parallel processing channels. Paragraph [0078] referenced by the Examiner discusses a parallel image reconstruction technique. Parallel image reconstruction is so named because, as discussed above, a plurality of signals are read out in ***parallel***. As pointed out on page 1 of the present application, such parallel collected signals are

typically digitized and fed serially through a reconstruction unit. Sodickson does not suggest a hardware architecture with a plurality of stages of parallel processing channels, much less reconfiguring the computer resources among such parallel processing channels.

Dependent **claim** 7 calls for a specific structure for the stages of each of the parallel channels. Sodickson does not describe parallel processing channels, much less with what stages such parallel processing channels should be configured. Rupp does not cure this shortcoming. Rather, Rupp merely indicates that the end user can configure the computer resources as desired. Neither Sodickson, nor Rupp, nor the combination disclose or motivate one to design a processing channel arrangement set forth in claim 7.

Claim 8 calls for the final stage of the parallel processing channels to be connected with a combining unit. Neither Sodickson nor Rupp teach or fairly suggest using a plurality of parallel processing channels which feed into a combining unit nor provide any motivation to so configure configurable architecture for improved magnetic resonance imaging.

Claim 23 calls for the output of each of the parallel pipelines to be an image and for the combining unit to combine images. Again, such an image reconstruction technique is not disclosed by or motivated by Sodickson. Rupp is merely directed towards computer resources.

Accordingly, it is submitted that **claim 1 and claims 2, 3, 6-10, 23 and 24 dependent therefrom** now distinguish patentably over the references of record.

Claim 12 is directed to a method for processing MR signals in which one of a plurality of receive coil configurations is selected. The various receive coil configurations have different numbers n of outputs. The receive coil configuration is connected with a scanner that has m RF receivers such that n of the receivers are used, where n is an integer with varies with the selected receive coil configuration. Thus, when there are m receivers, n can be any integer from 1 to m.

Moreover, claim 12 calls for dynamically reconfiguring the processing units in accordance with the number of outputs of the selected receive coil configurations to allocate the processing units to form pipeline stages for processing channels.

While Sodickson suggests that multiple processor can be utilized, Sodickson makes no suggestion of dynamically configuring the processing units to form stages for processing channels in accordance with the number of outputs of the selected receive coil configuration. Indeed, it is submitted that Sodickson does not address adapting a system for use with receive coils with different numbers of outputs.

Rupp discloses reconfigurable computer architecture, but makes no suggestion that the architecture should be reconfigured dynamically in accordance with the number of outputs of a selected receive coil configuration.

Because neither Sodickson nor Rupp provide motivation for reconfiguring computer processing units in accordance with the number of output channels of a receive coil configuration, it is submitted that **claim 12 and claims 14-20, 25, and 26 dependent therefrom** distinguish patentably and unobviously over the references of record.

Claim 14 calls for processing the data on each of the parallel processing channels to form images in each channel.

Claim 16 adds weighting the output of each channel and combining the weighted outputs.

Claims 17-20 add still further details of the data/image processing technique.

It is submitted that the combination of Sodickson and Rupp fail to teach or suggest such further limitations.

Claims 18 and 20 are directed to a method of iterative reconstruction. **Farwell** provides no motivation to alter the Sodickson reconstruction technique to become an iterative reconstruction technique.

Claim 21 has been placed in independent form to set forth details of one embodiment for processing the MR signals. Sodickson does not process the MR signals the claimed manner. Rupp is directed to reconfigurable computer architecture provides no motivation to modify the RF signal processing of Sodickson in the claimed manner. Accordingly, it is submitted that **claim 21 and claim 22 dependent therefrom** distinguish patentably and unobviously over the references of record.

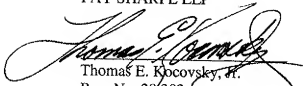
CONCLUSION

For the reasons set forth above, it is submitted that claims 1-4, 6-10, 12, and 14-26 distinguish patentably over the references of record and meet all statutory requirements. An early allowance of all claims is requested.

In the event the Examiner considers personal contact advantageous to the disposition of this case, she is requested to telephone Thomas Kocovsky at (216) 861-5582.

Respectfully submitted,

FAY SHARPE LLP



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